

32993 128624

FOR RELEASE ON DELIVERY

EXPECTED AT 1:30 p.m.

Thursday, December 5, 1985

UNITED STATES GENERAL ACCOUNTING OFFICE

Washington, D.C.

STATEMENT OF

MARTIN M FERBER, ASSOCIATE DIRECTOR

NATIONAL SECURITY AND INTERNATIONAL AFFAIRS DIVISION

BEFORE THE

SUBCOMMITTEE ON MANPOWER AND PERSONNEL

SENATE COMMITTEE ON ARMED SERVICES

ON

PROPOSALS TO CHANGE THE  
MILITARY RETIREMENT SYSTEM



034008

Mr. Chairman and Members of the Committee:

We are pleased to provide the views of the U.S. General Accounting Office on military retirement reform issues contained in the fiscal year 1986 Defense Authorization Act. This Act reduced the amount of funds that could be obligated from the military basic pay and the retirement accrual accounts and required the Department of Defense (DOD) to submit legislative proposals to reform the military retirement system to meet this reduced obligational authority. On November 21, 1985, DOD submitted its proposals and its views of their potential impact on retention.

You asked for our comments on DOD's proposals, specifically (1) the accuracy of the estimated accrual savings which would result from enacting DOD's proposals, (2) DOD's estimate of the impact on retention, and (3) the potential funding deficiency arising from delays in enacting legislation to change the military retirement system. With me today are Dr. John Harper, who directs our military compensation studies, and Dr. William McNaught, who directs our economics analysis studies.

#### BACKGROUND

By way of introduction, I would like to briefly discuss (1) the structure of the current military retirement system, (2) the recent change to accrual accounting for retirement annuities, (3) recommendations made in prior studies of the system, and (4) DOD's proposals to change the system.

## Current Military Retirement System

The structure of the current military retirement system has remained essentially unchanged since World War II. Its major features include (1) an immediate annuity to a service member who completes 20 years of service, with no annuity for a service member who separates before then, (2) an annuity that ranges between 50 to 75 percent of basic pay depending on the number of years of military service, and (3) an annuity that is adjusted annually for cost of living increases. In addition, the military retirement system is noncontributory. However, the service member contributes to the social security system and thereby earns eligibility for social security retirement benefits. Unlike common private-sector practice, the receipt of the social security retirement benefit does not reduce the level of military retired pay.

The current statutory service requirement for military retirement is 30 years of active duty. Nonetheless, members and retirees frequently refer to the current system as the "20-year" retirement system. Service members do not have the right to retire after 20 years--but only to request retirement and transfer to Reserve status. However, virtually all requests for retirement are granted routinely.

In practice the typical enlisted member or officer retires soon after 20 years of service. Because retired pay is then received for so long, an average of 35 years, its total value is quite substantial. For example, the lump-sum equivalent of

retired pay for a typical enlisted member retiring on January 1, 1985, was \$255,003 (in 1984 dollars, assuming a 1.6 percent real interest rate). The comparable amount for a typical officer was \$599,149.

#### Change to Accrual Accounting

In 1984, the Congress required DOD to change its method of accounting for the future retirement cost of current military members. Beginning in fiscal year 1985, the DOD was required to account for its retirement costs using accrual accounting--a method of recording liabilities for retirement benefits earned in one year and setting aside funds in the budget for that year to pay the retirement annuities that eventually will be received. The accrual amount is computed by an independent Board of Actuaries.

DOD's proposals for changing the retirement system are intended to comply with Congressional direction to reduce the retirement accrual funding by \$2.9 billion--from \$18.2 billion to \$15.3 billion in fiscal year 1986. Because the proposals apply only to new members, there will be no reduction in federal outlays until these members begin retiring in 20 years.

If enacted, DOD's proposals would reduce the accrual from 34.0 percent of Regular Military Compensation to 29.6 percent--which is still larger than the current 27.9 percent accrual for the federal civil service workforce and the 22 to 25 percent accrual that would result from enacting some of the proposed changes to civil service retirement the Congress is now considering. Furthermore, while both military and civil service

accrual are stated as a percentage of total personnel cost, the number of service members who historically have received retired pay is lower--13 percent--than the number of civil servants who have historically received retired pay--23 percent.

#### Prior Study Recommendations

Nine studies conducted since 1969 have recommended extensive structural changes to the military retirement system. The studies have repeatedly identified manpower problems arising from the current retirement system. One problem identified was that retention incentives under the present system become weak after members complete 20 years of service. All nine of the studies--including five done by the DOD--have recommended changes in the system to increase the incentives for longer service careers. While retaining more senior personnel could slow promotions and adversely affect retention rates of junior personnel, those retained are also the most experienced and thus possibly the most productive members of the military. Current trends in manpower requirements tend to emphasize skill and training while placing less importance on "youth and vigor."

Another problem identified was that the current system does not provide retirement benefits (aside from Social Security) for members who fail to complete 20 years of service. Although the services have the option of separating unproductive members involuntarily before 20 years, the prospect of depriving them of benefits makes supervisors very reluctant to use this option. Eight of the nine studies recommended providing earlier vesting

to make it easier to separate personnel involuntarily short of the 20-year point.

DOD's Proposals to Change  
Military Retirement

As opposed to the major structural changes recommended in prior studies, DOD's current legislative proposals to reform the military retirement system require only minor modifications leaving the basic structure of the current system unchanged.

As directed by the Congress, DOD has developed two options for reducing the retirement accrual funding in fiscal year 1986, and both apply only to those entering on duty after legislation is enacted. One of the two options involves reducing the multipliers for years of service and incorporating high-5 years of basic pay as the basis for determining retired pay. Under this option, retired pay would be equal to 2.15 percent of the high-5 years of basic pay for each year of service up to 20, and 3.2 percent for each year after 20 and up to 30. Full cost of living adjustments would be made. By contrast, under the current system retired pay is equal to 2.5 percent of the high-3 years of pay (or final pay for those entering before September 8, 1980) times the number of years of service up to 30 years.

The second option assumes a high-3 basis and uses multipliers of 2.2 percent per year for 20 years of service, and 3.1 percent for 21 to 30 years. The cost of living adjustment for non-disability retirees would be based on the percentage increase in the Consumer Price Index (CPI) minus one percentage point with a one-time restoral at the 40th anniversary of entry

into the service. Restoral would consist of recomputing retired pay at that point assuming the full CPI had been in effect. Disability retirees and survivors would receive full cost of living protection.

The effect of these changes for the typical enlisted retiree--with 20 years of service--would be to provide between 36 and 40 percent of final basic pay during retirement depending on the option. By comparison, the current retirement system (for those who enlisted since September 8, 1980) will provide about 45 percent of final basic pay.

#### METHODOLOGY USED TO ESTIMATE ACCRUAL SAVINGS

The first area you asked us to address was the actuarial analysis DOD used to estimate the accrual savings of its proposals. Our objective was to determine whether DOD's analysis was done in accordance with accepted actuarial practice. Our review was limited--in view of the time available to perform it--and consisted of examining an audit recently done by an actuarial consulting firm under contract to the DOD's Board of Actuaries, analyzing evidence gathered during an actuarial audit we conducted in 1982, and discussions with DOD's Chief Actuary.

Based on our review, we conclude that DOD used the methodology and assumptions approved by the Board Actuaries, as required by law, to determine that the proposals would produce the required level of savings in the accrual charges. In appendix I we discuss some technical aspects of DOD's actuarial

analysis that may have implications for accrual cost savings in the long term.

METHODOLOGY USED TO  
EVALUATE RETENTION EFFECTS

The second area you asked us to address was the methodology DOD used to evaluate retention effects. Unlike assessing the actuarial analysis, evaluating the impact of the proposed changes on retention is a very inexact science because there are few tools available to make such assessments.

It is DOD's assessment that the retirement changes would have severe consequences and result in a loss of about 41,000 service members who would otherwise have remained in the military. However, the consequences of the change, as seen by DOD, have to be analyzed within a context of the uncertainty involved in evaluating a current change that will not have an impact for many years.

At different points in their careers, military members are most influenced by different factors in making career decisions--to include staying in the military or leaving. For example, a DOD report submitted to the House Armed Services Committee last year concluded that monetary variables such as pay, benefits, and civilian employment opportunities were clearly powerful predictors of first-term reenlistment. Variables such as assignment location, quality of life, and job conditions were also important--especially after the first term.

Retention analyses and survey data show that the prospect of retiring at 20 years of service becomes very important only

after the 8 to 10 year point. It is not just the amount of retirement pay that encourages retention, but also the all-or-nothing aspect of the 20-year retirement system and other retirement benefits that are important.

Therefore, it will be 8 to 10 years from a change today before any real impact would become evident. Even then the impact may be indistinguishable from the effects of other factors which might change in the meantime. For example, DOD points out that the adverse effects on retention of the 1980 change to the high-3 years of pay for calculating retired pay were likely mitigated by pay raises and other compensation initiatives such as the variable housing allowance. Other important factors which might change include the state of the economy and the public's attitude toward the military.

Finally, we are talking about a change based on today's force structure and projecting it 8, 10, 20, or more years in the future when no one knows what changes in force structure may be needed to respond to threats to our national security.

With these general cautions in mind, I have some specific comments on DOD's analysis of the projected impact of its proposals on retention. My comments will cover four points:

1. Some positive aspects of a military career.
2. The method used to assess retention effects.
3. The sensitivity of the method to changes in assumptions.
4. Some actions that may be necessary if retention does pose a problem.

Positive Aspects of  
Military Service

The positive aspects of military life may outweigh any loss of retirement income for those who are considering a military career.

DOD appropriately points out that a military career requires an acceptance of a highly disciplined life and the abridgment of some individual freedoms. Commonly referred to as the "X factor" of military life, it is this very factor that attracts some to a military career. Other positive aspects of military life include job security and various benefits such as free health care and commissary and retail shopping privileges. In addition to also being motivated by patriotism, many military members may view their compensation (even with changes in retirement) as competitive with what they might receive outside the military. In this regard GAO has done analyses for the Senate Appropriations Committee which show that military members take home a greater portion of their income than civil servants at the same salary level.<sup>1</sup>

While the proposed changes will reduce retired pay, it should be noted that the retired service member continues to receive, in addition to pay, other benefits such as commissary and retail shopping privileges--which the military estimates as a 25 percent savings--and free medical care for themselves and

---

<sup>1</sup>Military and Federal Civilian Disposable Income Comparisons  
1985 Pay Rate (GAO/NSIAD-85-58)

their families. Also at 20-year retirement the service member is provided a financial base from which to start a second career.

In its report DOD raises what it terms a basic question-- "If military retirement benefits are too great or too lucrative as some have claimed, why do so few remain for a career?" Part of the answer seems to us to be given in DOD's enlistment slogan "its a great place to start." Many young people are joining the military to (1) learn a technical skill or trade (2) take advantage of the new GI bill and the Army College Fund, which can provide over \$25,000 towards college, (3) start a job when one in the private sector may not be available or as attractive, and (4) serve their country. It is usually not until much later that they seriously consider making the military a career.

#### The Method Used to Estimate Retention Effects

The Congress directed that DOD use the methodology employed by the Fifth Quadrennial Review of Military Compensation (QRMC) in evaluating the impact of its proposals. The QRMC used some of the most advanced methods available to assess the effects on retention of proposals it analyzed. A key part of its methodology was an econometric model. We think it is important to understand what this model can and cannot do.

The model considers only the effect of monetary factors including the effect of deferred compensation in the form of a retirement annuity. It can not assess the effect of such other factors as the loss of individual freedom, the propensity to

serve in the military, the desirable or undesirable aspects of frequent moves or overseas assignments, the quality of military leadership, public attitudes toward the military, and congressional willingness to shore up any retention losses with increases in compensation. And as a result, the predictions made by the model may not come to pass.

The model focuses on the future civilian and military income that an individual service member may be comparing when deciding to stay in, or leave, the service. The income differences are then related to historical retention rates in order to estimate what future retention rates would be, based on changes in the retirement annuity.

Stated another way, the model presumes that individuals considering whether or not to reenlist after the first term evaluate the potential income differences that would exist each year over their lifetimes.

#### Model Sensitivity

The model used is very sensitive to changes in the variables it evaluates. In its report DOD states that, compared with analysis done by the Army, its projected retention impacts are conservative. We would point out that making slightly different assumptions about these variables could result in significantly different projected impacts.

For example, altering two key variables--that deal with how military members value future income and respond to changes in income--significantly reduces the model's prediction of retention losses.

Our analysis shows that as many as about 12,600 more enlisted personnel in the 11-20 years-of-service group might remain in the service than DOD's analysis indicates. In the 21-30-year group as many as about 1,700 more might remain than DOD's analysis indicates. The analysis for officers shows similar results. (See appendix II for our analysis of the model and its sensitivity to assumptions about key variables.)

#### What If Retention Is a Problem?

There are actions that can be taken to increase retention if, or when, it becomes necessary to do so. Some of these actions would involve additional expenditures, others probably would not. Among actions that may not cause additional expenditures are increased attention to retention management, changes in leadership style, and enhancement of the quality of military life. Among actions that would involve additional expenditures are increases in pay and bonuses. With regard to these increases, research has shown that these actions are cost-effective relative to the retirement benefits in maintaining retention at adequate levels.<sup>2</sup> Further, as noted above, the predicted adverse impacts of changing the retirement system are not expected to begin to materialize for at least 10 years, according to both DOD's and GAO's analysis. Hence, there will be ample time to implement these measures if they become necessary.

---

<sup>2</sup>Congressional Budget Office, Modifying Military Retirement - Alternative Approaches, Washington, D.C.: USGPO, April 1984.

POTENTIAL FUNDING  
DEFICIENCY

The last area you asked us to address was the potential funding deficiency. Because the legislation directing the change in the retirement system has not yet been enacted DOD is in a funding deficiency position. Unless relief is authorized, consequences not intended by the Congress may result.

The fiscal year 1986 Defense Authorization Act directed DOD to propose legislative changes to the military retirement system that would achieve a total of \$2.9 billion savings in basic pay and retirement accrual. However, the Congress apparently did not intend for DOD to reduce basic pay since the Conference Report on the Authorization Act specifically stated that the \$2.9 billion savings was to come from the retirement accrual.

DOD cannot reduce its monthly accrual charge until the Congress enacts legislation changing the current retirement system. Since DOD assumes that the Congress did not intend it to reduce force levels, DOD has been spending basic pay and accruing retirement charges at a level in excess of amounts authorized for fiscal year 1986. As a result, DOD faces a potential funding deficiency and estimates that, if no retirement-reform legislation is enacted and it continues to spend at current basic pay and retirement accrual levels, its military personnel account would be exhausted by approximately September 10, 1986.

To avoid the funding deficiency, DOD submitted, along with the two legislative proposals required by the Authorization Act,

an additional legislative proposal to restore \$242 million in obligational authority for each month's delay in passing legislation required to effect retirement changes. However, from a strictly legal point of view this action by itself is insufficient to solve the funding deficiency problem and avoid a future violation of the anti-deficiency provision of title 31 U.S.C. 1512, which states:

"an appropriation available for obligation for a definite period shall be apportioned to prevent obligation or expenditure at a rate that would indicate a necessity for a deficiency or supplemental appropriation for the period."

As a practical matter, the only way DOD could avoid a funding deficiency is to reduce the force to a level which would result in sufficient funds to pay that reduced force and set aside its retirement accrual for all of fiscal year 1986.

DOD recognizes that if its proposed relief legislation is not enacted expeditiously other measures to prevent a funding deficiency will be required, such as an immediate draw-down in the active duty and reserve forces strength levels. A DOD official told us that DOD is still considering ways to avoid the funding deficiency in the event the Congress does not enact the relief legislation.

The longer the period required to enact changes to the military retirement system, the greater will be the funding deficiency. Either DOD is granted appropriate relief or it

should be taking steps to plan and implement actions to comply with the anti-deficiency act.

- - - - -

That concludes my prepared statement. We would be happy to answer any questions you may have.

GAO OBSERVATIONS ON DOD'S ESTIMATES  
OF ACCRUAL COST SAVINGS

On the basis of a limited review, GAO believes that the two proposals developed by DOD to reduce the fiscal year 1986 accrual charge by \$2.9 billion will in fact save that amount. However, during our review we identified two factors related to long term accrual cost which merit the Committee's attention.

First, until now the Board of Actuaries has required use of a method for calculating the accrual charge known as the unweighted normal cost percentage method. This method calculates the accrual charge based on the benefit formula that applies to the most recent group of military recruits. This method was used to estimate the fiscal year 1986 reduction in the accrual charge associated with the two options developed by DOD. However, starting in fiscal year 1987 the Board of Actuaries is requiring use of a new method to calculate the accrual charge. This method is known as the weighted normal cost percentage method and involves calculating separate cost percentages for each benefit formula in effect, and then weighting these by the respective percentages of payroll to obtain a single accrual charge.<sup>1</sup> If a less costly benefit formula is enacted into law, and is grandfathered (i.e., applies only to new recruits) its impact on the weighted normal cost is less than its effect on the unweighted normal cost. Hence,

---

<sup>1</sup>The accrual charge is equal to the product of the normal cost percentage and basic pay.

the reduction in the accrual charge associated with these proposals in fiscal year 1987 and succeeding years will be less than \$2.9 billion.

Second, the \$2.9 billion estimated reduction in the accrual charge is partly based on the assumption that historical retention rates will continue into the future. This is in accordance with accepted actuarial practice and has been approved by the DOD Board of Actuaries and hence is legally binding. However, DOD's analysis of the impact of its proposals predicts that there will be reductions in retention levels, although these reductions are not expected to be observed for 10 years or more. If these predicted reductions come to pass, then:

- Presumably the Board of Actuaries would approve altered retention rate assumptions that reflect these new patterns.
- The normal cost percentage for fiscal year 1986 would have been lower than 42.6 percent.
- The accrual reduction would have been greater than \$2.9 billion.

However, as discussed in appendix II, considerable uncertainty exists concerning the magnitude of the effects of DOD's proposals on retention levels.

GAO OBSERVATIONS ON THE ACOL MODEL  
USED TO ESTIMATE RETENTION EFFECTS  
OF DOD'S 1985 RETIREMENT PROPOSALS

The Department of Defense's (DOD's) estimates of the potential force structure effects from enacting its proposed retirement changes are derived from a computer simulation model developed by the Fifth Quadrennial Review of Military Compensation (QRMC). Congress had directed the DOD to use this model. The QRMC's model is a version of what military manpower economists call the Annualized Cost of Leaving (ACOL) model. The ACOL model has several advantages in this kind of analysis. First, the model is unique in that it permits analyses of retention for both the officer and enlisted communities of all four services. And second, it is operationally practical to use.

An essential test of the soundness of a model like ACOL involves determining its accuracy in predicting the effects of changes such as those proposed by DOD. Since there have been no major changes to the retirement system on which to test the model's accuracy (the change to high-3 years of pay as the basis for determining retired pay has yet to produce discernible effects), the following tests take on critical importance:

- An assessment of the theoretical validity of the model to determine the extent to which the theory embodied in the model is capable of approximating reality.
- An assessment of the parameters and variables of the model to determine their sensitivity to changes in the key assumptions built into the model.

This attachment presents the results of our assessments of the model's validity, including the results of a sensitivity analysis which demonstrates the range of uncertainty present when it is used to analyze the potential retention effects of DOD's proposed retirement changes.

### THEORETICAL VALIDITY

Theoretical validation involves a review of the theories underlying a model and the major assumptions which have been made to adapt the theories to the problem being analyzed. The results of our theoretical analysis are presented in three sections. The first section describes the rationale underlying the ACOL model. The second outlines the major theoretical criticisms of the ACOL model, and the third discusses the QRMC version of ACOL and how it handles these theoretical criticisms.

#### The Rationale of the ACOL Model

Suppose at age 23 Sergeant Smith is thinking about whether to stay in or leave military service. Even though Sergeant Smith may be able to extend for as little as an additional year, his thinking may go well beyond that--perhaps going to the 20 years needed to qualify for a retirement benefit or even for a full 30-year career.

The ACOL model separates Sergeant Smith's decision into two parts. First, it assumes Sergeant Smith asks "Do I want to remain in military service, or do I want to leave now?" Second, it assumes Sergeant Smith asks "If I choose to stay, for how long should I stay?"

If Sergeant Smith were to decide his preferred military career would last up to 30 years of service, Figure 1 illustrates what the ACOL model assumes he considers in terms of future income when deciding whether he is better off separating now or completing this military career. If he separates now, his future income will follow the civilian income line, which in our example is higher than the military income line until age 49.

If he reenlists and stays in military service for a full 30 year career, then his future compensation might follow the military income line. At retirement, he enters civilian life and is compensated along the civilian income line, but also receives an additional military retirement annuity. As drawn on Figure 1, the essence of Sergeant Smith's problem is whether the loss of some higher civilian income between age 23 and age 49 is worth the additional retirement income to be received over the remainder of his lifetime.

The ACOL model reduces this set of income differences to a single number called the Annualized Cost of Leaving or ACOL from which the model takes its name. The ACOL is the annual amount of discounted compensation necessary to eliminate the income difference in Figure 1. A separate ACOL exists for each possible military career length.

To answer Sergeant Smith's first question--"Do I wish to stay in the military?"--the model compares the estimated ACOL value for the different military career lengths to a variable representing his preference for a civilian career, that is:

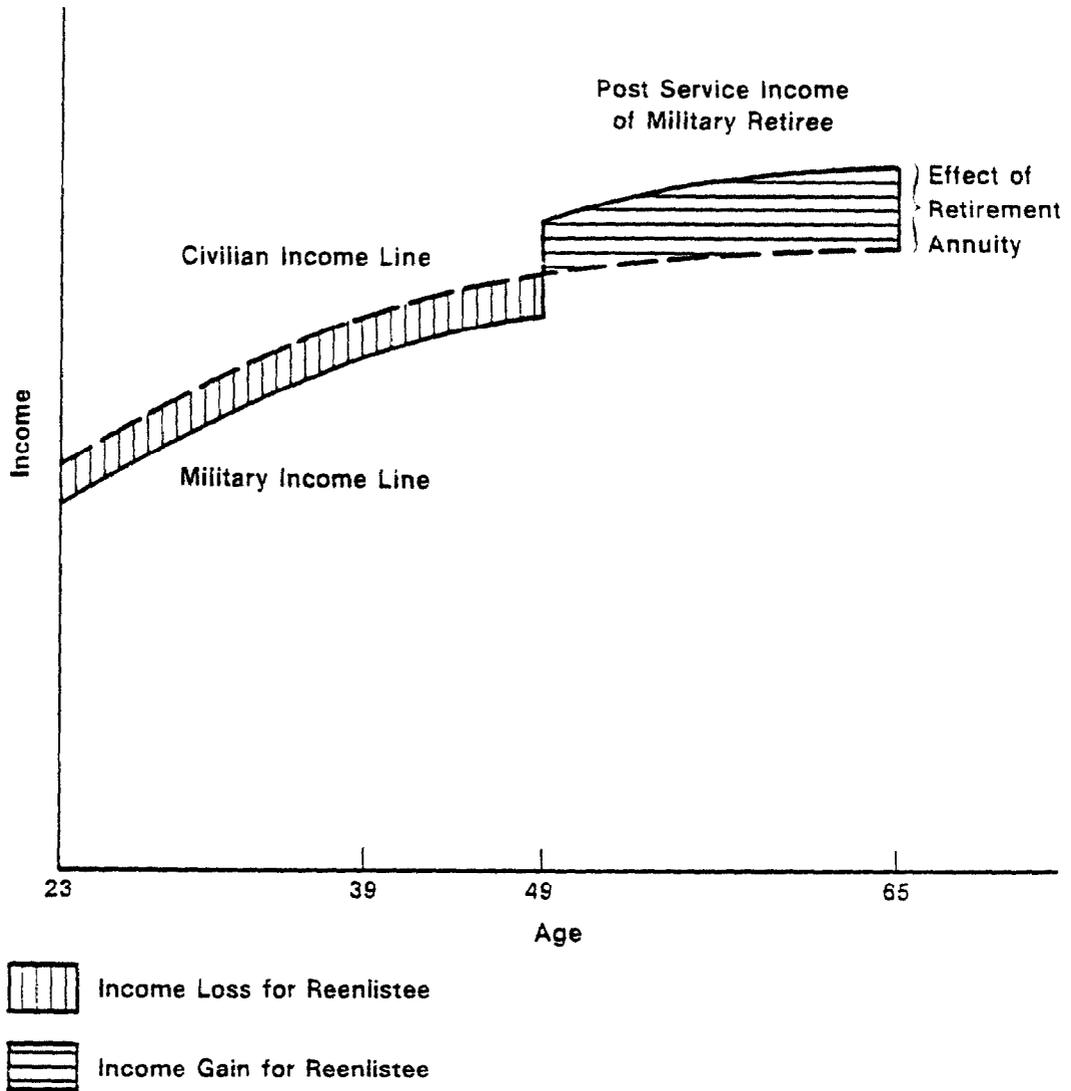


Figure 1: Illustration of Military-Civilian Income Differences

--if the value of ACOL is greater than the preference of a civilian career, he stays.

--if the value of ACOL is less than the preference for a civilian career, he separates.

If there is at least one desirable career length for which the first of these two conditions holds, then the model predicts that Sergeant Smith will stay.

To answer the second question--"How long should I stay?"--the model assumes he chooses the career length that has the largest value over preferences for a civilian career. In most cases, the preferred career length is a single reenlistment term for soldiers with less than 8 years of service, a 20-year career for soldiers with more than 8 to 12 years of service, and a full 30-year career for soldiers with more than 20 years of service.

Sergeant Smith's preferences for civilian or military life cannot be known as far as the model is concerned. They therefore enter the model as a statistical error factor. Thus the ACOL model usually specifies that the probability of reenlistment =  $f(B_0 + B_1 \text{ACOL})$  where  $f$  represents Sergeant Smith's preferences, ACOL is the annualized cost of leaving, and  $B_0$  and  $B_1$  are the parameters to be estimated.

The specific relationship between ACOL and the probability of reenlistment is assumed to be an S-shaped curve known as the logistic curve. The parameter  $B_1$ , known as the labor supply

parameter,<sup>1</sup> is especially important because it determines how large a behavioral response (i.e., lower retention rates) will be predicted in response to a reduction in the level of future retirement benefits.<sup>2</sup>

The ACOL model calculates predicted reenlistment rates for "typical" service members based on the framework described here, and then translates these reenlistment rates into a force profile (i.e., a frequency distribution of personnel by the number of years that they have been in the service). The QRMC ACOL model is a steady-state model which means that it starts with an initial force profile, known as the baseline profile, that is expected to continue into the future in the absence of any changes in compensation of policy. The DOD report, following the QRMC, has used the average continuation rates over the fiscal year 1976 to 1982 period and the associated force profile as a baseline.<sup>3</sup>

---

<sup>1</sup>This is closely related to, but not identical to, the concept of "elasticity" that is widely used in military manpower analyses and other economic analyses.

<sup>2</sup>The DOD report asserts that the reenlistment functions used in the QRMC ACOL were estimated from changes in reenlistment bonuses. This is not strictly true, as the QRMC estimated the effect on the retention levels of changes in ACOL and reenlistment bonuses were but one source of variation in the ACOL measure across year-of-service groups. Other sources of variation include all elements of compensation and rank which vary across year-of-service groups.

<sup>3</sup>Several experts whom we interviewed have suggested that it would be more realistic to use baseline data from a more recent period when retention rates were higher. Because of the lack of model documentation, we were unable to carry out a sensitivity analysis to determine whether DOD's findings would be affected by the use of a more recent baseline period.

The ACOL model calculates new retention rates associated with changes in compensation policy (e.g., changing the retirement system) and derives a new force profile. It is important to note that the model implicitly assumes that the force profile is determined by the decisions of individual service members to stay or leave, and not by service policies that seek to manage the force or congressional constraints.

#### Major Theoretical Criticisms of the ACOL Model

Two of the major theoretical criticisms of the ACOL model concern how the unknown preferences should be dealt with. The first criticism relates to how preferences for the military change over time for a cohort of entering recruits. Members of the cohort who remain in the military for each successive reenlistment are more likely to have higher preferences for military life (or conversely lower preferences for civilian life) than those who leave. As more individuals with preferences for civilian careers leave the military, the estimated labor supply parameter,  $B_1$ , will be overstated as the distribution of preferences becomes more uniform. That is, the impact on retention of a change in military retirement benefits will be overstated. Many users of the ACOL approach, including the QRMC, have added an additional variable, length of service, to control for change in preferences.

The second criticism of the ACOL approach is that it does not take into account the effects of such random events<sup>4</sup> as especially good or bad assignments, or sickness in the family which also influence more people to stay who would otherwise have left. One recent study used simulation techniques to show that to the extent that random events influence retention decisions, the model will underpredict the sensitivity of retention rates to a variety of hypothetical changes in the retirement system.<sup>5</sup>

A third theoretical criticism of the ACOL model involves how the ACOL measure is constructed. The ACOL model is considered a "maximum regret" model because it compares the value of staying until the "best" future decision point with the value of leaving at the current decision point. Therefore, it will not predict any retention effects for pay changes that do not affect the maximum ACOL value and the time horizon over which ACOL values are maximized. This limits the type of policy changes which may be evaluated using this model since there are some policy alternatives which may change the alternative ACOL values but not affect the best ACOL value or time horizon, while other policy changes may lead to abrupt changes in the time horizon. For example, DOD's analysis in its report of the

---

<sup>4</sup>This is mentioned both in John Warner, "Alternative Military Retirement Systems: Their Effects on Enlisted Retention," Center for Naval Analysis CRC 376, 1979, and R.Y. Arguden, "Personnel Management in the Military: Effects of Retirement Policies on the Retention of Personnel," Rand Graduate Institute, 1985, as well as in the Fifth QRMC report P. I-51.

<sup>5</sup>A mathematical proof of this is available in Arguden, Appendix A.

option for cutting \$5.4 billion in accrual changes is an example of a policy option for which ACOL is not well suited because of this very stringent assumption. In this case, the ACOL model predicted that this option would encourage 30-year careers rather than 20-year careers and thus improve retention despite the severe reduction in the benefit formula, an implausible result.

#### How the Theoretical Criticisms Have Been Handled

The QRCM ACOL model deals with changes in the distribution of preferences by adding an additional variable to capture the increase in preferences for the military during the first term of service. However, when major shifts in retention patterns (due to sizeable changes in the retirement benefit) are analyzed with this model, this variable will not adequately adjust the model's predictions to the new pattern of preferences among those entering the military. Therefore, the QRCM model will tend to overstate the retention effect of large changes in the retirement benefit, such as eliminating the program.

#### VALIDITY OF PARAMETERS AND VARIABLES

The major criticism of the validity of ACOL's parameters and variables relates to the variable representing the lifetime earnings available to the service-member making the decision to stay or leave. There are three general components of this variable: military income, civilian income, and the discount rate.

Discount Rates

The annualized cost of leaving is the annualized difference between the present value of the pay stream of remaining in the military or leaving and going to the civilian sector. The critical assumption in determining present value is the individual's personal discount rate. Personal discount rates are the rates at which individuals are willing to trade additional future income for current income. The higher one's personal discount rate, the more strongly one prefers current to future income and, conversely, the less one cares about changes in the expected value of future income. This affects the ACOL model in that the lower the discount rate chosen to calculate the ACOL variable, the more weight given to the retirement benefit in the income stream. With a low discount rate, changes in the retirement policy will cause larger retention effects than with higher discount rates. Therefore, the choice of the appropriate discount rate is critical to the interpretation of changes in the retirement benefit.

In the ACOL model used by the QRMC, a sliding discount rate is computed for both officers and enlisted personnel: starting at 16.5 percent in year one, declining to 7.3 percent in year nineteen, and 7.0 percent in year thirty. The slide is very steep; the average discount rate over thirty years is 8.1 percent. This is a unique approach to estimating the discount rate. Several experts we interviewed question its theoretical justification. However, these experts do not agree on the appropriate discount rate. In fact, the estimates range from 3

to 30 percent. Most reported empirical estimates of personal discount rates have exceeded 10 percent. Analysts favoring relatively low discount rates argue that the military tends to attract people who prefer deferred compensation.

#### Military Compensation

The QRMC ACOL model calculates military compensation using service-specific strengths by grade and year of service to reflect promotions and special entitlements such as incentive pay or bonuses. Once rank, years of service and special supplemental pays have been established, calculation of the military compensation stream is simple. However, complications arise from the assumptions that must be made about promotions, and thus rank.

The first complication arises from imputing promotion probabilities into the model: individuals who have greater or lesser likelihood of being promoted cannot be identified. The average promotion probabilities are used for all personnel, the differences among individuals--which may change their decisions to stay or leave--become random events in the model. As mentioned earlier, these random events would be expected to exert a downward bias on the estimated coefficient of the ACOL variable.

The second problem in measuring military compensation is that the military's rank structure is constrained by congressional authorizations and service policy. Therefore, promotion opportunities are a function of the force profile (i.e., experience distribution) of the services. If changes in retirement policies cause changes in the force profile,

promotion probabilities could be affected. For instance, if a given change in the retirement system causes large losses of senior personnel, movement through the promotion "pipeline" may increase. From interviews with experts it does not appear that the QRMC ACOL model has taken this into account.<sup>6</sup>

The final complication arises from civilian earnings-- particularly the income that retirees will earn when they enter the civilian labor market. There are two major methodological issues involved.

First, the skills learned while in the military may be earnings enhancing only for the first few years in the service. That is, if the individual leaves after the first 4 years (or first term of service) he will probably earn as much or more as his peers in the civilian labor market.<sup>7</sup> However the longer he stays in, the lower his comparative earnings profile may be. Second, individuals who have high civilian income opportunities are more likely to leave military service than those with average or low civilian income opportunities. Therefore when separatees' civilian earnings are compared with the earnings of other veteran, or nonveteran, civilians who were already in the civilian labor market, the differential will be overstated. In this case military personnel are observed to earn less when they

---

<sup>6</sup>This should not be taken as a criticism of the developers of the ACOL model. It is likely that explicitly modeling such a "feedback" would substantially increase the computational complexity of the model.

<sup>7</sup>Coopers and Lybrand, Inc. Military Retirees' and Separatee' Post Service Earnings. App. Q to the Fifth QRMC Report.

enter the civilian labor market than their veteran or nonveteran peers because they would have anyway; the military experience itself had no effect.

All these issues highlight why it is extremely difficult to specify the correct alternative income stream for inclusion in the ACOL variable. The QRMC model did not specifically address any of the biases described above and so largely left the problem unresolved.

#### SENSITIVITY ANALYSIS OF THE ACOL MODEL

Given the uncertainty that exists as a result of the assumptions used in the ACOL model, standard professional practice calls for changing the assumptions within reasonable bounds to determine how sensitive the model's predictions are to the changes. Unfortunately, the structure of the ACOL model and the lack of documentation severely limited our ability to perform such an analysis. We were able, however, to analyze the sensitivity of the model to changes in two of its key variables: the labor supply parameter that indicates how responsive military members are to changes in retirement, and the personal discount rate.

We constructed "low" and "high" assumptions for the labor supply parameter that, according to standard or statistical sampling theory would have approximately a 95 percent probability of including the true value of the parameter. We believe this is a conservative procedure because it only accounts for uncertainty in the parameter associated with statistical sampling, and not

uncertainty associated with the possible flaws in the procedure used to estimate the parameter.

In the case of personal discount rates, we adopted a "low" assumed value of 5 percent--based on a recent study by the Army Research Institute and "high" assumed values of 12.5 percent for enlisted personnel and 10.3 percent for officers--based on a study done for the 5th QRMC.<sup>8</sup>

Our analysis, taken as a whole, is conservative in the sense that we only changed one variable at a time, in order to isolate the effect of each variable. If a sensitivity test were performed on more than one variable simultaneously (e.g., assuming a low supply parameter and a high personal discount rate), the range of estimates of impacts of changing the retirement system would be greater than those presented here.

The results of these analyses are presented in Table 1 through 4. These tables follow the same format as Table 4 of the DOD report in order to facilitate comparison. Although DOD analyzed the effects of the two options for changing the retirement system relative to both the final pay formula in effect before September 1980 and the current high-3 formula, we focus on the latter comparison, because by so doing we isolate the specific predicted effect of the options being considered here, over and above the effect of the implementation of high-3. While we also present only the results of the analyses pertaining

---

<sup>8</sup>Matthew Black, "Personal Discount Rates: Estimates for the Military Population." Study prepared for the Fifth QRMC Report, Appendix I, Attachment 3, 1984.

to enlisted personnel; the officer analyses lead to very similar conclusions.

Tables 1 through 5 demonstrate that changing the assumptions can have a significant impact on the model's predictions. For instance, DOD estimates that enactment of the "structure-only" option will lead to the loss of about 29,500 enlisted personnel with between 11 and 20 years of service. The corresponding number is about 19,600 if the high personal discount rate assumption is used, and about 36,200 if a high labor supply parameter is assumed.

Despite this difference, there are certain similarities between DOD and GAO analyses that should be noted. First, the predicted impacts of DOD's two proposals are nearly identical according to both the GAO and DOD analyses. In addition, all of the ACOL model runs predict the options will have very little impact on force strength among members with less than 10 years of service, and an increasing impact as one moves from the 11-20 year group to the 21-30 year group. To a large extent, these generalizations hold because the GAO sensitivity analyses involve altering specific operational assumptions within the same basic theoretical framework as DOD's analysis, and this framework constrains the model's predictions.

TABLE 1

IMPACT RELATIVE TO FORCE MANNING  
WITH HIGH-3 AVERAGING

## LOW LABOR SUPPLY PARAMETER ASSUMPTION

## ENLISTED

	TODAY'S <sup>a</sup> 7-YR AVG	FUTURE HI-3	STRUCTURE-ONLY OPTIONS	COMBINATION OPTIONS
Accessions	332,566	338,798	348,742	348,380
Difference			9,944	9,582
% change			2.9	2.8
YOS-1-4	1,030,789	1,049,868	1,079,447	1,078,403
Difference			29,579	28,535
% Change			2.8	2.7
YOS 5-10	389,147	390,397	387,411	387,557
Difference			-2,986	-2,840
% Change			-0.8	-0.7
YOS 11-20	329,573	323,075	299,868	299,966
Difference			-23,207	-23,109
% Change			-7.2	-7.2
YOS 21-30+	55,232	41,402	38,017	38,814
Difference			-3,385	-2,588
% Change			-8.2	-6.3
YOS 5-20	718,720	713,472	687,279	687,523
Difference			-26,193	-25,949
% Change			-3.7	-3.6
YOS 5-30+	773,952	754,874	725,296	726,337
Difference			-29,578	-28,537
% Change			-3.9	-3.8

<sup>a</sup>The figures in this column may differ from the corresponding figure in the DOD analysis because of rounding error.

TABLE 2

IMPACT RELATIVE TO FORCE MANNING  
WITH HIGH-3 AVERAGING

## HIGH LABOR SUPPLY PARAMETER ASSUMPTION

## ENLISTED

	TODAY'S <sup>a</sup> 7-YR AVG	FUTURE HI-3	STRUCTURE-ONLY OPTIONS	COMBINATION OPTIONS
Accessions	332,534	341,904	357,775	356,592
Difference			15,871	14,688
% change			4.6	4.3
YOS-1-4	1,030,691	1,059,134	1,106,296	1,102,864
Difference			47,162	43,730
% Change			4.5	4.1
YOS 5-10	389,115	390,300	385,535	385,920
Difference			-4,765	-4,380
% Change			-1.2	-1.1
YOS 11-20	329,646	318,926	282,761	283,217
Difference			-36,165	-35,709
% Change			-11.3	-11.2
YOS 21-30+	55,289	36,385	30,146	32,737
Difference			-6,239	-3,648
% Change			-17.2	-10.0
YOS 5-20	718,761	709,226	668,296	669,137
Difference			-40,930	-40,089
% Change			-5.8	-5.7
YOS 5-30+	774,050	745,611	698,442	701,874
Difference			-47,169	-43,737
% Change			-6.3	-5.9

<sup>a</sup>The figures in this column may differ from the corresponding figure in the DOD analysis because of rounding error.

TABLE 3

IMPACT RELATIVE TO FORCE MANNING  
WITH HIGH-3 AVERAGING

## LOW PERSONAL DISCOUNT RATE ASSUMPTION

## ENLISTED

	TODAY'S <sup>a</sup> 7 -YR AVG	FUTURE HI-3	STRUCTURE-ONLY OPTIONS	COMBINATION OPTIONS
Accessions	332,548	342,608	354,775	354,939
Difference			12,167	12,331
% change			3.6	3.6
YOS-1-4	1,030,732	1,060,890	1,097,166	1,097,700
Difference			36,276	36,810
% Change			3.4	3.5
YOS 5-10	389,129	388,556	385,460	385,529
Difference			-3,096	-3,027
% Change			-0.8	-0.8
YOS 11-20	329,615	318,054	288,089	286,717
Difference			-29,965	-31,337
% Change			-9.4	-9.9
YOS 21-30+	55,262	37,242	34,023	34,801
Difference			-3,219	-2,441
% Change			-8.6	-6.6
YOS 5-20	718,744	706,610	673,549	672,246
Difference			-33,061	-34,364
% Change			-4.7	-4.9
YOS 5-30+	774,006	743,852	707,572	707,047
Difference			-36,280	-36,805
% Change			-5.0	-4.9

<sup>a</sup>The figures in this column may differ from the corresponding figure in the DOD analysis because of rounding error.

TABLE 4

IMPACT RELATIVE TO FORCE MANNING  
WITH HIGH-3 AVERAGING

## HIGH PERSONAL DISCOUNT RATE ASSUMPTION

## ENLISTED

	TODAY'S <sup>a</sup> 7 -YR AVG	FUTURE HI-3	STRUCTURE-ONLY OPTIONS	COMBINATION OPTIONS
Accessions	332,559	337,504	345,910	344,666
Difference			8,406	7,162
% change			2.5	2.1
YOS-1-4	1,030,765	1,046,111	1,070,831	1,067,084
Difference			24,720	20,973
% Change			2.4	2.0
YOS 5-10	389,142	391,146	389,602	389,240
Difference			-1,544	-1,906
% Change			-0.4	-0.5
YOS 11-20	329,592	324,856	305,269	306,807
Difference			-19,587	-18,049
% Change			-6.0	-5.6
YOS 21-30+	55,246	42,624	39,032	41,606
Difference			-3,592	-1,018
% Change			-8.4	-2.4
YOS 5-20	718,734	716,002	694,871	696,047
Difference			-21,131	-19,955
% Change			-3.0	-2.8
YOS 5-30+	773,980	758,626	733,903	737,653
Difference			-24,723	-20,973
% Change			-3.3	-2.8

<sup>a</sup>The figures in this column may differ from the corresponding figure in the DOD analysis because of rounding error.

TABLE 5

SUMMARY OF DOD AND GAO ANALYSES OF  
IMPACTS RELATIVE TO FORCE WITH  
HIGH-3 AVERAGING MANNING

<u>Losses</u> <u>YOS 11-20</u>	<u>Structure-only</u> <u>options</u>	<u>Combination</u> <u>options</u>
DOD Assumptions	29,510	30,620
Low Labor Supply Parameter Assumption (Difference)	23,207 -6,303	23,109 -7,511
High Labor Supply Parameter Assumption (Difference)	36,165 6,655	35,709 5,089
Low Personal Discount Rate Assumption (Difference)	29,965 455	31,337 717
High Personal Discount Rate Assumption (Difference)	19,587 -9,923	18,049 -12,571
<u>Losses</u> <u>YOS 21-30+</u>		
DOD Assumptions	4,084	2,751
Low Labor Supply Parameter Assumption (Difference)	3,385 -699	2,588 -163
High Labor Supply Parameter Assumption (Difference)	6,239 2,155	3,648 897
Low Personal Discount Rate Assumption (Difference)	3,219 -865	2,441 -310
High Personal Discount Rate Assumption (Difference)	3,592 -492	1,018 -1,733

SUMMARY

GAO's examination of the methodology used by DOD to analyze the force manning effects of the two options for changing the military retirement system leads to the following observations:

1. The ACOL model represents the best analytical tool currently available for quantifying the impact of the proposed changes in the retirement system on retention of service members, and hence the force profile.
2. DOD correctly applied the ACOL model in analyzing the likely impact of the two principal options presented in the DOD report.
3. There is significant uncertainty concerning the specific economic and behavioral assumptions that ought to be employed in applying the ACOL model to the analysis of policy options such as the changes in the retirement systems currently under consideration. Under certain reasonable assumptions, the force manning impacts could be significantly smaller than those predicted by DOD, whereas under other reasonable assumptions, the impacts will be greater than indicated by the DOD analysis. Policymakers should be aware of this range of uncertainty.

32993